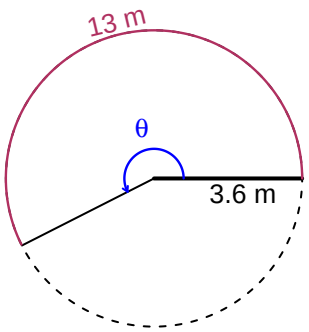
Name: Date:

Trig Final (SLTN v643)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 3.6 meters. The arc length is 13 meters. What is the angle measure in radians?

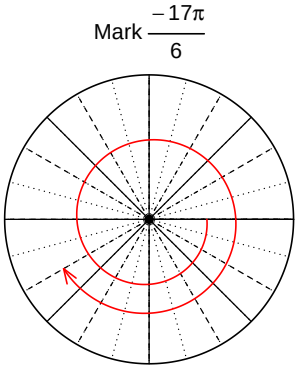


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

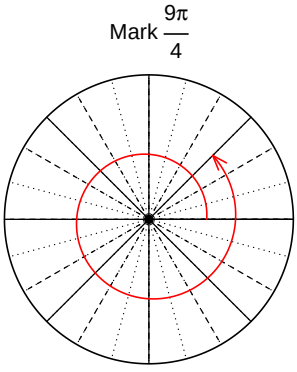
$\theta = 3.611$ radians.

Question 2

Consider angles $\frac{-17\pi}{6}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-17\pi}{6}\right)$ and $\cos\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(-17\pi/6)$



Find $\cos(9\pi/4)$

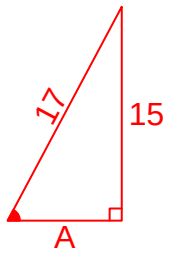
$\sin(-17\pi/6) = \frac{-1}{2}$

$\cos(9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{-15}{17}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

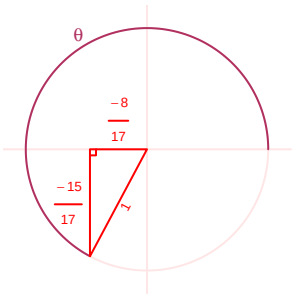
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 15^2 = 17^2$$
$$A = \sqrt{17^2 - 15^2}$$
$$A = 8$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-8}{17}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 8.21 meters, a midline at $y = 5.79$ meters, and a frequency of 6.83 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 8.21\sin(2\pi 6.83t) + 5.79$$

or

$$y = 8.21\sin(13.66\pi t) + 5.79$$

or

$$y = 8.21\sin(42.91t) + 5.79$$